

## Review of *Acrophotopsis* Schuster (Hymenoptera: Mutillidae: Sphaerophthalminae), with Description of a New Species from Baja California

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*Abstract.*—A new species, *Acrophotopsis mickeli* Pitts, is described based on 102 males collected in Baja California Sur. This raises the number of species of *Acrophotopsis* to four. *Acrophotopsis mickeli* differs from other *Acrophotopsis* species by having the following combination of characters, anterior fourth of the mesopleuron punctate, thin parameres with apices slightly curved dorsally, the cuspis more than eight times as long as wide, the distal third of the middle and hind femora darkened, and the metasoma not concolorous with head and mesosoma. A key is given for the species. Current distributional data and illustrations are given for *A. bergi* Casal, *A. campylognatha* Schuster, and *A. eurygnatha* Schuster.

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In a study of Mutillidae from the southwestern United States, 102 specimens of an undescribed species of *Acrophotopsis* were found in various collections. Seventy-two specimens were found at the Department of Entomology Collection, University of Arizona, Tucson. These specimens were determined to be *A. campylognatha* by Ferguson in 1961, but our work revealed that they represent an undescribed species. This new species is described, illustrated and discussed below. A key for all species of *Acrophotopsis*, along with current distributional data and illustrations, are also presented. In order to produce this review, however, several other taxonomic issues had to be addressed.

Little published information exists for *Acrophotopsis*. The genus was described by R.M. Schuster (1958) for two new species of Sphaerophthalmini from the Nearctic Region, *A. campylognatha* and *A. eurygnatha*. Males of *Acrophotopsis* are nocturnal and are normally collected with light-traps. They may reside in the leaf litter at the

base of bushes during the day like other nocturnal mutillid males (e.g., *Odontophotopsis* spp.) (Ferguson 1963). Nothing more is known about the biology of *Acrophotopsis*. Females of *Acrophotopsis* remain unknown, but are presumed to be active only at night.

Schuster (1958) included locality data and complete descriptions for the two new species of *Acrophotopsis*. At the time of writing the manuscript, however, he did not label the types for them or for the other 128 newly described species of other genera in the same manuscript. He waited until thirteen years after drafting the manuscript before visiting the various museums housing the material to insert type labels as he saw fit (Ferguson 1967). Due to this oversight, not all of the original specimens were found by Schuster, and some may have been mislabeled.

Several more problems regarding the designation of Schuster's *Acrophotopsis* type material were found during our study. For *A. campylognatha*, sixteen paratypes were found. However, Schuster had

not originally designated any paratypes for this species. Because these specimens were not published in Schuster (1958), they cannot be considered paratypes and have been included here in the material examined section. A similar problem occurs for *A. eurygnatha*. Schuster (1958) designated 16 paratypes for *A. eurygnatha*. Thirteen additional specimens (USNM) are labeled as paratypes, but they are not among the designated paratypes and are not conspecific with *A. eurygnatha*. In actuality, we have identified them as specimens of the new species described here. As with *A. campylognatha*, there may be many more specimens labeled as paratypes of *A. eurygnatha*, and some of them may not be conspecific with *A. eurygnatha*. Without an exhaustive search of all museums, we cannot determine how many other specimens were labeled as paratypes by Schuster after the original description. Schuster did designate holotypes for *A. campylognatha* and *A. eurygnatha*, which have been located and are properly labeled.

Another difficulty with the treatment by Schuster (1958) is that it uses *campylognathus* and *eurygnathus* as the specific epithets of the new species of *Acrophotopsis*. According to Article 30.1.2 of the 4th edition of the Code of Zoological Nomenclature (I.C.Z.N. 1999), names ending in *-opsis* are of feminine gender. Thus, the specific epithets of Schuster's two species of *Acrophotopsis* should be *campylognatha* and *eurygnatha*, rather than *campylognathus* and *eurygnathus*.

Casal (1967) described a third species of *Acrophotopsis*, *A. bergi*, based on a single male specimen from the state of Morelos, Mexico. According to Casal (1967), *A. bergi* differs from the generic characters described by Schuster, but only in the general aspect of genitalic characters. These characters resemble those of *Dilophotopsis*, a genus Schuster (1958) also described. These similarities prompted Casal (1967) to question Schuster establishing *Dilopho-*

*topsis* as a separate genus from *Acrophotopsis* and suggested more work should be done to determine the relationships between them.

Careful examination of specimens of *Acrophotopsis* and *Dilophotopsis* clearly support Casal's concerns. Schuster (1958) noted the following similarities between *Acrophotopsis* and *Dilophotopsis*: 1. hypopygium emarginate distally, 2. mandibles strongly developed, dorsoventrally dilated, 3. parameres strongly flattened, curving mesad, with the apices normally overlapping *in situ*, 4. petiole slender, nodose, 5. second metasomal tergite with small punctures, 6. mesopleuron with anterodorsal region impunctate and the posterodorsal region coarsely punctate, 7. tibial spurs 1-2-2, 8. plumose setae distinct, and 9. head in dorsal outline somewhat transversely subrectangular. Wing venation also is similar between *Acrophotopsis* and *Dilophotopsis*. Similarities 1-3 appear to be synapomorphies for a clade including these genera. The wing venation may also support the monophyly of *Dilophotopsis* and *Acrophotopsis*, but a more thorough evaluation of the wing venation in other sphaerophthalmine genera is necessary.

In addition, Schuster (1958) stated that *Acrophotopsis* differs from *Dilophotopsis* by having an unarmed mesosternum, parameres that overlap *in situ*, distinct ventral felt lines and a modified mentum. However, the genitalia of *A. bergi* are similar to those of *Dilophotopsis* spp. in that the parameres do not overlap *in situ* (Casal 1967). Also, the cuspidis of *A. bergi* are elbowed as in *Dilophotopsis*. A further complication of Schuster's comparison of *Acrophotopsis* and *Dilophotopsis* is that some specimens of *D. stenognatha* have distinct sternal felt lines. Thus, with the addition of *A. bergi* and a closer inspection of the two genera, some of Schuster's (1958) diagnostic characters are no longer valid.

The only characters currently separating *Acrophotopsis* and *Dilophotopsis* are the presence of the mesosternal processes in

*Dilophotopsis* and the presence of a triangular carina on the mentum of *Acrophotopsis*. The occurrence of mesosternal processes also varies intergenerically in other Sphaerophthalmini. Many genera of Sphaerophthalmini in the southwestern United States are differentiated by this character in conjunction with other characters. Modification of the mentum into an anterior tubercle or posterior lingulate process has otherwise only been used, in part, to separate the subgenera of *Photomorphus* Viereck.

With the lack of robust generic-level characteristics distinguishing *Acrophotopsis* from *Dilophotopsis*, we believe that these two genera may be synonymous. However, synonymy of these two genera would be premature without a phylogenetic hypothesis of the subtribe Sphaerophthalmina. Although phylogenetic hypotheses for the subfamilies of Mutillidae exist (Brothers 1975, 1999, Lelej and Nemkov 1997), there is no hypothesis available for this subtribe. More informative characters could be added when the females of *Acrophotopsis* are described. For now, existing data and information are used to present the following new and revised diagnoses and keys for *Acrophotopsis*.

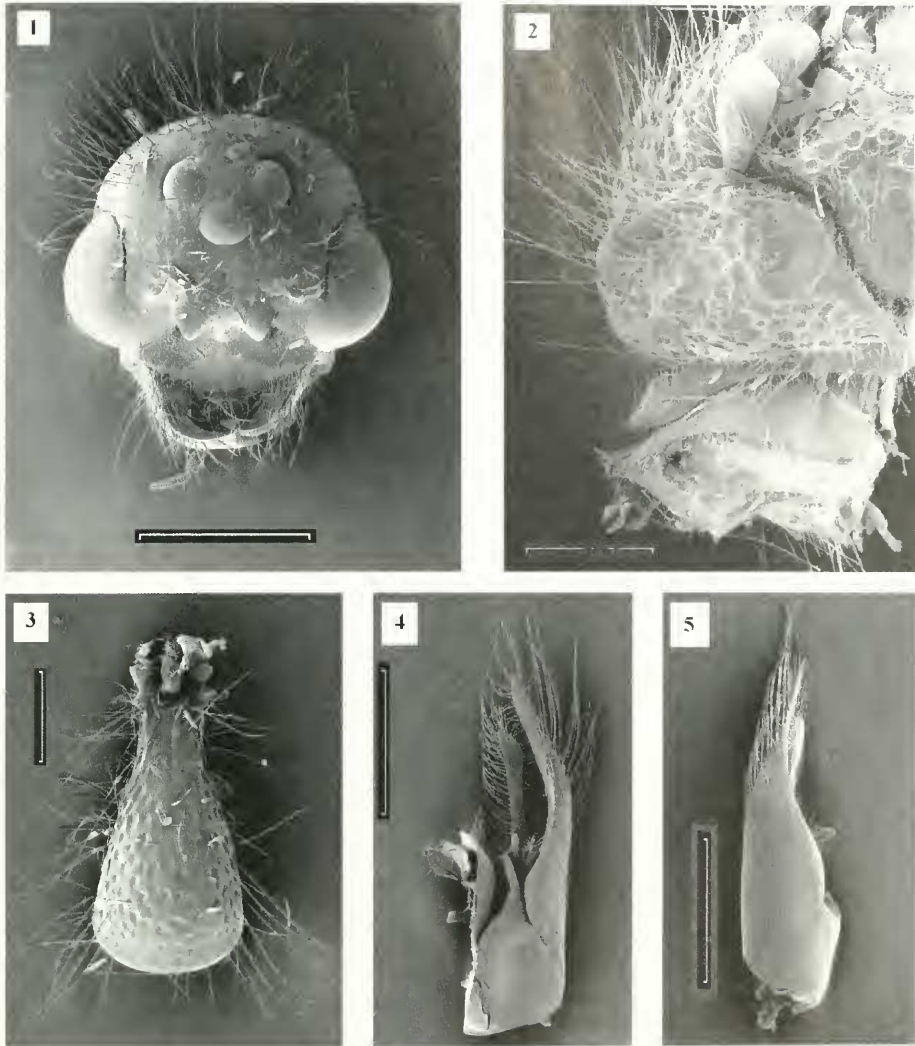
#### MATERIALS AND TERMINOLOGY

The following acronyms are used for institutions or collections housing the material discussed in the current study: The Bohart Museum of Entomology, University of California, Davis, California (UCDC); Canadian National Collection of Insects, Ottawa, Canada (CNCI); Cornell University Insect Collection, Department of Entomology, Cornell University, Ithaca, New York (CUIC); Department of Entomology, California Academy of Sciences, San Francisco, California (CASC); Department of Entomology Collection, University of Arizona, Tucson, Arizona (UAIC); Insect Collection, Los Angeles County Museum of Natural History, Los Angeles, California (LACM); James P. Pitts Collection, Athens, Georgia

(JPPC); United States National Museum, Smithsonian Institute, Washington D. C. (USNM); University of Minnesota Insect Collection, Department of Entomology, St. Paul, Minnesota (UMSP); UCR Entomological Teaching and Research Collection, University of California, Riverside, California (UCRC).

We use the following notation for punctures in the order of increasing size, depth, and their proximity: fine, small, moderate, coarse, and reticulate after Ferguson (1967). Fine refers to shallow punctures that have slanted or curved walls and are separated by greater than  $10\times$  their width (Fig. 1). Small refers to punctures that have slanted walls and are separated by  $2\text{--}10\times$  their width. Moderate refers to punctures that are separated by  $0.5\text{--}2\times$  the width of the puncture, with curved to vertical walls and punctures that tend to be circular (Fig. 11, mesonotum medially). Coarse refers to punctures that are closely spaced ( $0.2\text{--}0.5\times$  puncture width) with vertical walls and punctures are usually circular (Fig. 11, pronotum). Reticulate refers to sculpturing that resembles a network of lines with the punctures closely spaced (distance between punctures  $<0.2\times$  puncture width) with vertical walls. The punctures of reticulate sculpturing are not necessarily circular. In some cases (e.g., Fig. 3), punctures are elliptical, not circular, and may not be complete. For these irregularly shaped punctures, measurements are made using the maximum transverse width of the puncture. The term "micropunctate" refers to punctures that are extremely shallow and do not have vertical walls or sharp margins. We use the term "simple setae" for hairs that are smooth and do not have barbed surfaces. "Brachyplumose setae" refers to hairs with barbs that are less than, or equal to, the width of the shaft at the attachment of the barb. The term "plumose setae" is used for hairs that have longer barbs. We follow the terminology suggested by Menke (1993) for the scutum





Figs. 1–5. Paratype: *Acrophotopsis mickeli*. 1, Head, anterior view, scale 1.0 mm. 2, Prothorax, lateral view, scale 0.5 mm. 3, Petiole, dorsal view, scale 0.5 mm. 4, Genital capsule, lateral view. 5, Genital capsule, dorsal view, scale 0.5 mm.

rather than that of Schuster (1958). The term “tibial spurs” is used instead of “calcaria.” T2, T3, etc., denotes the second, third, etc., metasomal tergites, respectively. Similarly, S2, S3, etc., signifies the second, third, etc., metasomal sternites, respectively.

*Acrophotopsis mickeli* Pitts, new species  
(Figs. 1–5)

*Male holotype*.—Length: 11 mm. *Coloration*: Head and mesosoma reddish-brown,

metasoma darker. Integument reddish-brown under T2 felt line. Ocellular triangle dark brown and integument around and under felt lines of T2 and S2 dark brown. Antenna dark yellow. Frons, vertex, mesosoma, coxa, trochanter, and femur with sparse, white, erect, brachyplumose setae. Mandibles, apical margin of clypeal lobe, tibia, and tarsus with golden, erect, brachyplumose setae. Clypeus with short white brachyplumose setae on lateral margins. Legs yellow, femur dark-

ened apically. Apical margins of tergites and sternites with sparse, white, decumbent, plumose setae. Wings hyaline with golden setae. Pterostigma and veins yellowish brown. *Head*: width 2.2 mm, posterior margin rounded (Fig. 1). Punctures fine, not deep, widely separated (Fig. 1). Compound eyes protruding, maximum diameter 0.9 mm (Fig. 1). Median ocellus 0.4 mm, lateral ocellus 0.3 mm, ocellocular distance 0.4 mm, and interocellar distance 0.4 mm; ommatidia apparent (Fig. 1). Malar space very short, 0.1 mm long. Antennal scrobe with inconspicuous carina present dorsally, becoming absent halfway between compound eye and antennal tubercle (Fig. 1). Small tubercles present halfway between compound eye and antennal tubercle, slightly ventral to carina (Fig. 1). Antennal scrobe glabrous (Fig. 1). Antennal tubercles glabrous and impunctate (Fig. 1). Clypeus slightly concave; median lobe projecting, slightly concave distally with a thick up-turned margin (Fig. 1). Clypeus glabrous, except median lobe with fine punctures apically (Fig. 1). Mandible with three apical teeth and one large basal tooth; basal width of mandible 0.4 mm, width of mandible at basal tooth 0.4 mm, width of mandible at preceding sinus 0.3 mm, apical width of mandible 0.5 mm. Scape with ventral carina. Length of scape, pedicel and first three flagellomeres: 0.8, 0.2, 0.3, 0.4 and 0.4 mm, respectively; width of first flagellomere 0.2 mm. *Mesosoma*: Pronotum, scutum and scutellum coarsely punctate (Fig. 2). Pronotal epaulets present (Fig. 2). Parapsidial furrows present on posterior three-fourths of scutum. Propodeum reticulate, reticulations broader anteriorly. Propleuron (Fig. 2) and mesopleuron moderately punctate, punctures of mesopleuron broader than those of propleuron. Metapleuron glabrous and impunctate. Prosternum with fine punctures. Mesosternum unarmed, with moderate punctures. Legs with femora finely punctate. Prothoracic tibia with fine punctures. Meso- and metathoracic tibiae with

small punctures. Tibial comb curving away from leg apically. Internal tibial spur of mesothoracic leg curving toward leg. Wings with pterostigma 0.9 mm long measured along costa. Marginal cell 1.2 mm long. Second submarginal cell pentagonal, 0.9 mm long. *Metasoma*: Petiolate. T1 nodose. Punctures of segment 1 moderate. Punctures of segments 2–6 fine. T7 micropunctate with glabrous, impunctate, margin. S7 broadly emarginate, with fine punctures towards margin. Length of T2 felt line equal to approximately  $3\times$  length of S2 felt line. *Genitalia*: Parameres arcuate, stout at base and slightly flattened toward apex, tapering, slightly inwardly and dorsally curved, with long setae present on outer margin (Figs. 4, 5). Cuspis elongate, not reaching to apex of paramere, straight with apical portion slightly dilated, basal portion cylindrical, distal portion and inner margin with long setae, dorsomedial area sparsely and minutely pubescent (Fig. 5). Digitus cylindrical and minutely pubescent (Figs. 4, 5).

*Female*.—Unknown

*Host*.—Unknown

*Type material*.—Holotype  $\delta$ , Mexico, Baja California Sur, 6 mi. SW Santiago, 31.VIII.1959, Light Trap, K.W. Radford & F.G. Werner (CASC); Paratypes, 11 $\delta$ , same data as holotype (UAIC, CASC, JPPC).

*Other material examined*.—MEXICO, Baja California Norte: 1 $\delta$ , 17 mi S Ensenada, 14.VI.1938, M. Bacher & E. Ross (USNM); Baja California Sur: 1 $\delta$ , Agua Caliente, Cape Region, Hwy Sur, 18.X.1941, E. Ross & R.M. Bohart (CASC); 1 $\delta$ , 2 mi N Cabo San Lucas, Hwy Sur, 16.I.1959, H.B. Leech (CASC); 1 $\delta$ , 20 mi N Comundo, 23.VII.1938, M. Bacher & E. Ross (USNM); 25 mi. W La Paz, 37 $\delta$ , 30.VIII.1959, 12 $\delta$ , 4.IX.1959, K.W. Radford & F.G. Werner (UAIC); 1 $\delta$ , 20 mi NW La Paz, 16.VII.1938, M. Bacher & E. Ross (USNM); 1 $\delta$ , Las Animas, Sierra Laguna, 18.X.1941, E. Ross & R.M. Bohart (CASC); 1 $\delta$ , 6 mi S Mirallores, 18.I.1959, H.B. Leech (CASC); 1 $\delta$ , San Bar-

tolo, 13.VII.1938, Bacher & E. Ross (CASC); 1♂, San Ignacio, 4 mi. W, 26.VIII.1959, K.W. Radford & F.G. Werner (UAIC); 1♂, 15 mi N San Ignacio, 24.VI.1938, M. Bacher & E. Ross (USNM); 4♂, 10 mi. SW San Jose del Cabo, 1.IX.1959, Light Trap, K.W. Radford & F.G. Werner (UAIC); 1♂, 2 km W San Jose del Cabo, 30.VI.1982, W. N. Cross (JPPC); 2♂, 7 mi N Santa Anita, Hwy Sur, 7.I.1959, H.B. Leech (CASC); 2♂, Santiago, 8.VII.1938, M. Bacher & E. Ross (USNM); 3♂, San Venancio, 8.X.1941, E. Ross & R.M. Bohart (CASC); 8♂, Todos Santos, 10.X.1941, E. Ross & R.M. Bohart (CASC); 5♂, 4 mi. N Todos Santos, 2.IX.1959, K.W. Radford & F.G. Werner (UAIC); 6♂, Triunfo, 13.VII.1938, M. Bacher & E. Ross (USNM); 1♂, 6 mi N, 15.VII.1938, M. Bacher & E. Ross (USNM).

**Variation.**—Total body length 8.2–11.5 mm; head width 1.81–2.30 mm; compound eyes, maximum diameter 0.68–0.96 mm; median ocellus 0.25–0.38 mm; lateral ocellus 0.23–0.32 mm; ocellocular distance 0.30–0.42 mm; interocellar distance 0.33–0.41 mm; malar space 0.08–0.12 mm. Color variation exists among some of the specimens in that some have a lighter T2 than the holotype and have the apical third of the middle femur only slightly darkened. However, all have the integument beneath the felt lines darkened and the apical third of the hind femur darkened.

**Etymology.**—Named for one of the most notable students of Mutillidae, Clarence E. Mickel.

**Comments.**—*Acrophotopsis mickeli* differs from *A. campylognatha* by being smaller, having the distal third of the middle, and hind femora darkened and having the metasoma darkened, at least under the felt lines. The anterior half of the mesopleuron of *A. campylognatha* is impunctate and polished, whereas the mesopleuron of *A. mickeli* has punctures that gradually deepen posteriorly and is only impunctate on the anterior fourth. *Acrophotopsis mickeli* differs from *A. eurygnatha* by being slightly larger, having the distal third of middle

and hind femora darkened and having a larger ventral tooth on the mandible (width of mandible at excision approximately equal to depth of excision, not distinctly greater than the depth of excision as in *A. eurygnatha*). The wing venation is similar for all four species (as in Fig. 10).

The genitalia of *A. mickeli* (Figs. 4, 5) most closely resemble those of *A. campylognatha* (Figs. 15, 16). The genitalia of *Acrophotopsis mickeli*, however, differ from those of *A. campylognatha* by having slightly longer cuspids and thinner parameres.

### *Acrophotopsis bergi* Casal

(Figs. 6–9)

*Acrophotopsis bergi* Casal 1967:2, ♂. Type data: Mexico, Morelos, 3 mi N of Alpuyecá, at light, 3.XII.1959, H.E. Evans and D.M. Anderson (CUIC).

**Diagnosis.**—*Acrophotopsis bergi* is highly autapomorphic. It differs from all congeners by having a transverse furrow between epaulets of the pronotum (Fig. 6), and by having the cuspids elbowed (Figs. 8, 9) and bearing four broad, distally curved spines on the internal boarder, as well as smaller, distally curved, spines, basal to the 4 larger spines (Figs. 8, 9). Also, the parameres of *A. bergi* do not overlap *in situ* as with the other species of *Acrophotopsis* (Casal 1967).

**Other material examined.**—MEXICO, 1♂, Puebla, Izúcar de Matamoros, 1.VIII.1968, F.D. Parker & L.A. Stange (JPPC).

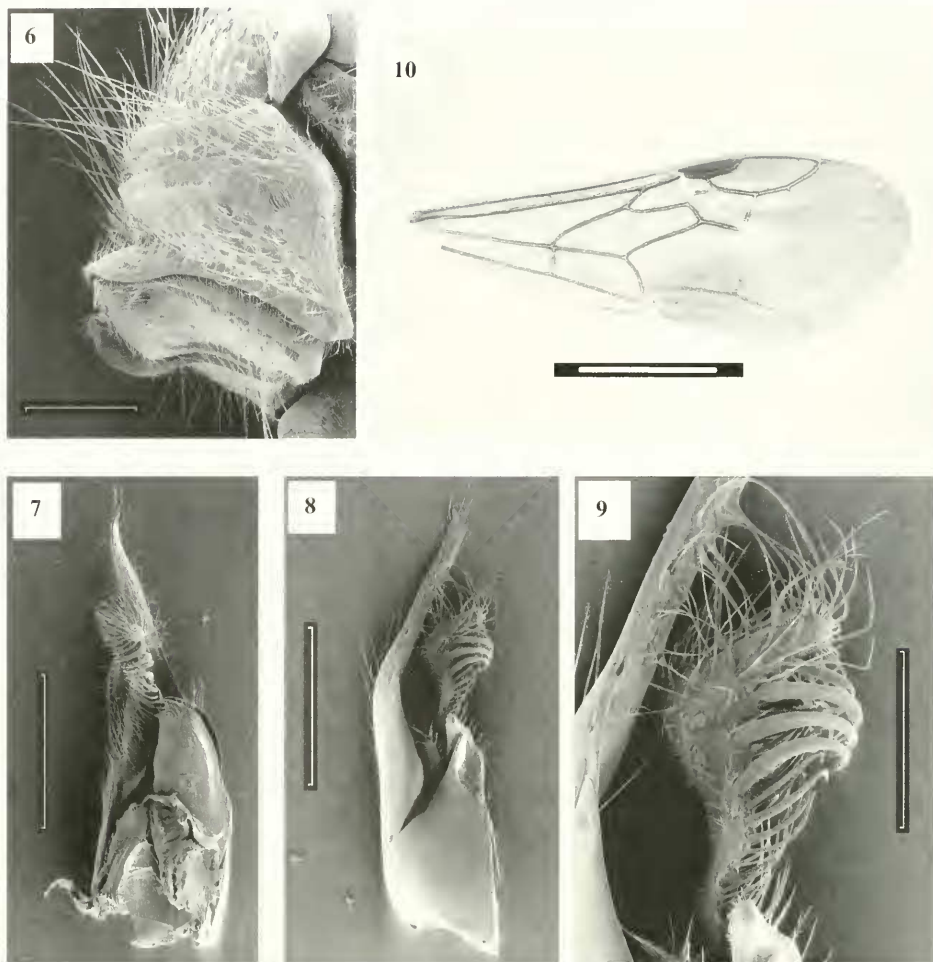
**Distribution.**—From the limited number of known specimens, this species occurs in regions south of Mexico City, Mexico, in the states of Morelos and Puebla.

**Remarks.**—The new specimen does not significantly differ from the holotype.

### *Acrophotopsis campylognatha* Schuster

(Figs. 15–16)

*Acrophotopsis campylognathus* Schuster 1958:69, ♂. Type data: Mexico, Baja California, Arroyo Rosarito, 29.III.1935, C.M. Brown (CASC).



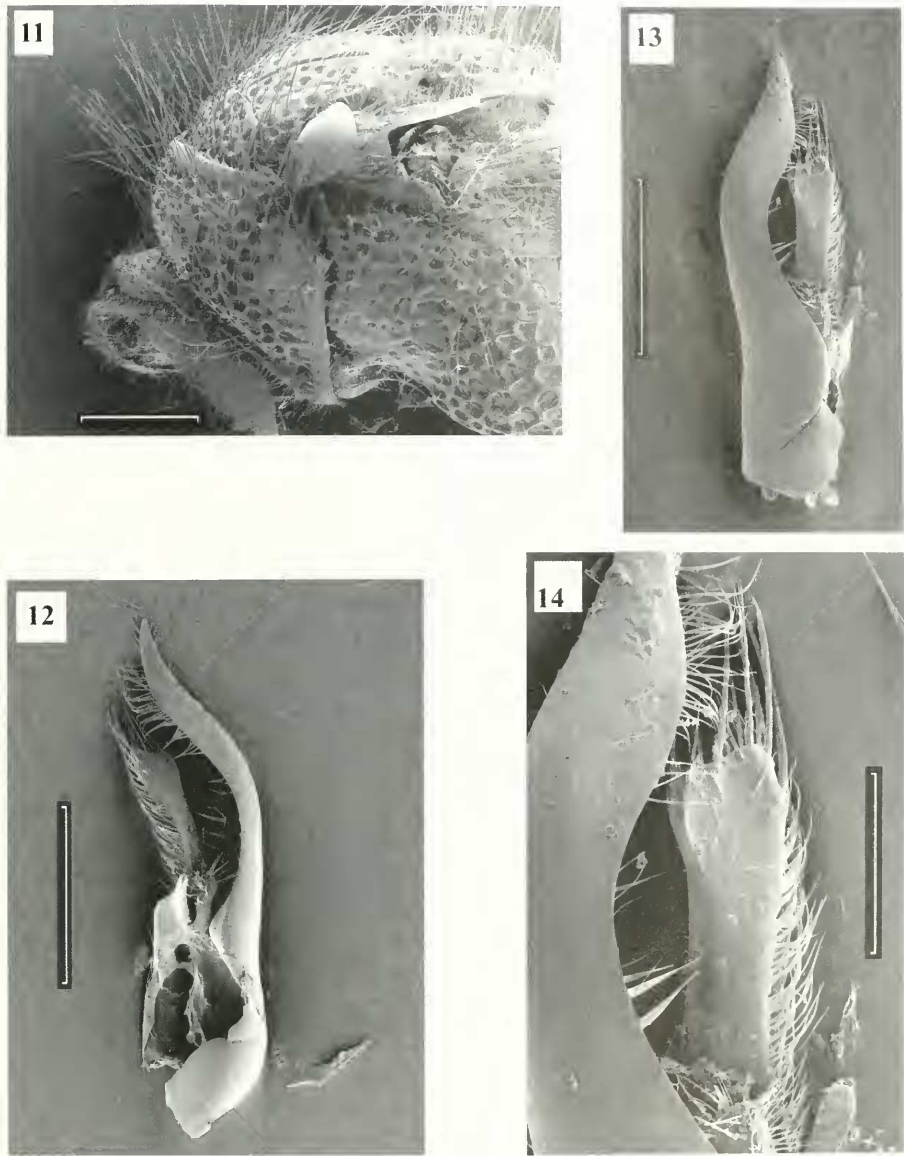
Figs. 6-10. *Acrophotopsis* species. 6-9. *A. bergi*. 6, Prothorax lateral view, scale 0.5 mm. 7, Genital capsule, mesal view. 8, Genital capsule, ventral view; scale 0.5 mm. 9, Cuspis, ventral view, scale 0.2 mm. 10. *A. eurygnatha*, wing, scale 2 mm.

**Diagnosis.**—*Acrophotopsis campylognatha* is the largest species of *Acrophotopsis*. The metasoma is concolorous with the head and mesosoma and the integument is not darkened under felt lines. The anterodorsal half of the mesopleuron is glabrous. The genitalia of *Acrophotopsis campylognatha* (Figs. 15, 16) are similar to those of *A. mickeli* (Figs. 4, 5) but differ by having slightly shorter cuspis and thinner parameres that are straight.

**Other material examined.**—USA, California, Riverside Co.: Deep Canyon, 1♂, 2.V.1963, P.M. Estes (UMSP); 1♂,

30.V.1963, 1♂, 13.VI.1963, E.I. Schlinger (UCRC); Palm Springs, 1♂, 23.V.1917 (CASC); 1♂, Tahquitz Canyon, 8.VI.1957, Menke, Stange, & Bromley (LACM). MEXICO, Baja California Norte: 3♂, Arroyo Rosarito, 27.III.1935, C.M. Brown (UMSP); Catarina, 1♂, 114° 40', 29° 45', 3.IV.1935, G.W. Harbinson (UMSP); 5♂, 15 mi. N El Refugio, 4.VII.1938, M. Bacher & E. Ross (CASC); 3♂, Ensenada, Las Animas Cañon, 27.VI.1925, W.S. Wright (UMSP); 7♂, 17 mi S Ensenada, 14.VI.1938, M. Bacher & E. Ross (CASC); 2♂, 15 mi N Punta Prieta, 29.VII.1938, M. Bacher & E. Ross





Figs. 11–14. *Acrophotopsis eurygnatha*, 11, Prothorax, lateral view, scale 0.5 mm. 12, Genital capsule, ventral view, scale 0.5 mm. 13, Genital capsule, dorsal, scale 0.5 mm. 14, Cuspis, dorsal view, scale 0.2 mm.

(CASC); 1♂, San Vicente, 14.V.1939, C.E. Norland (LACM); 1♂, San Venecio, 8.X.1941, E. Ross & R.M. Bohart (CASC); Baja California Sur: 1♂, 10 mi NE Cabo San Lucas, Hwy Sur, 17.I.1959, H.B. Leech (CASC); 5♂, 10 mi S Catavina, 29.VII.1938, M. Bacher & E. Ross (CASC); 2♂, 1 mi NE El Cien, 31.III.1975, M. Odano (LACM); 4♂, 10 mi E Mesquitil, 23.VI.1938, M.

Bacher & E. Ross (CASC); 2♂, Miraflores, 8.VII.1938, M. Bacher & E. Ross (USNM); 2♂, 19 mi E Rosario, 17.VI.1938, M. Bacher & E. Ross (CASC); 2♂, 10 mi N San Ignacio, 24.VI.1938, M. Bacher & E. Ross (CASC); 2♂, 15 mi N San Ignacio, 24.VI.1938, M. Bacher & E. Ross (USNM); 1♂, 12 mi S Santa Rosalia, 27.VI.1938, M. Bacher & E. Ross (CASC); 1♂, Todos San-





Figs. 15–16. *Acrophotopsis campylognatha*, genital capsule. 15, Lateral view. 16, Dorsal view, scale 0.5 mm.

tos, 10.X.1941, E. Ross & R.M. Bohart (CASC); 2♂, Triunfo, 13.VII.1938, M. Bacher & E. Ross (CASC); Baja California (?), 1♂, Hamilton Ranch, 2.VIII.1938, M. Bacher & E. Ross (USNM); 1♂, El Arco Mine, 14 mi S, 23.VI.1938, M. Bacher & E. Ross (USNM).

*Distribution.*—*Acrophotopsis campylognatha* is present in the southern regions of the Mojave Desert of California and into the Sonoran Desert of Baja California, Mexico.

*Remarks.*—Sixteen specimens were found that were labeled as paratypes by Schuster. Because these specimens were not published in Schuster (1958), they cannot be considered paratypes and have been included here in the material examined.

***Acrophotopsis eurygnatha* Schuster**  
(Figs. 10–14)

*Acrophotopsis eurygnathus* Schuster 1958:65, ♂.

Type data: USA, Arizona, Gila Co., Globe, 8.VII.1949, Werner & Nutting (CASC).

*Diagnosis.*—This species is highly autapomorphic. Its genitalia differs from all congeners by the presence of thick, flattened parameres and stout cuspidis (Figs. 12–14). The apices of the cuspidis are armed with straight, stout spines and the internal boarder of the cuspidis are armed with short, stout, ventrally curving spines, as well as being sparsely clothed with setae (Figs. 13, 14). The punctation of the mesosoma (Fig. 11) tends to be deeper and denser than the other species (Figs. 2, 6). Also, the metasoma is darker than the head and mesosoma or the integument of the mesosoma is at least darkened under felt lines. The mesopleuron is glabrous anteriorly for approximately  $\frac{1}{4}$  its length.

*Type material.*—Paratypes: USA, Arizona, Pima Co., Quitjotoa, 3♂, 27–28.VIII.1928, J.C. Bradley (CUIC).

*Other material examined.*—USA, Arizona, Gila Co.: 1♂, 6 mi. E. Rte 288, nr. Cherry Creek, at Light, 19.V.1950 (CUIC); Globe, 1♂, 12.V.1934, F.H. Parker (UMSP); 1♂, 9.VI.1936, F.H. Parker (UMSP); 2♂,

13.VI.1938, D.K. Duncan (UMSP); 1♂, 15.VI.1938, D.K. Duncan (UMSP); 2♂, 20.VI.1936, F.H. Parker (UMSP); 1♂, 25.VI.1938, D.K. Duncan (UMSP); 1♂, 30.VI.1937; 1♂, 13.VII.1936; 1♂, 5.VIII.1937; 2♂, 8.VIII.1933; 2♂, 19.VIII.1935; 1♂, 22.VIII.1937; 1♂, 26.VIII.1937, F.H. Parker (UMSP); 2♂, Globe, Parker Ranch, Six-Shooter Cyn., 22.VIII.1952, H.B. Leech & J.W. Green (CASC); Globe, Pinal Creek, 1♂, 6.VI.1953, 2♂, 7.VI.1959, 1♂, 7.VI.1963, A. & H. Dietrich (CUIC); 1♂, Gila Head, 25.VIII.1935, F.H. Parker (UMSP); Cochise Co.: Cochise Stronghold, Dragoon Mts., 1♂, 17–21.V.1970, 1♂, 15–20.VI.1970, R.J. Share (UAIC); 1♂, Huachuaca Mnts, Sierra Vista, 18.III.1963, Sternitsky (CNCI); Portal, 1♂, 22.VIII.1959, 4♂, 5.IX.1959, H.E. Evans (CUIC); 1♂, 1 mile S Portal, 4.VI.1965, Davidson, Davidson, & Cazier (LACM); 1♂, Willcox, 9–10.VIII.1970, S. Kozloski (UAIC); 3♂, Coconino Co., 23.VIII.1940, F.W. Nunenmecher (UMSP); 1♂, Graham Co., Bonita Creek, 17.VIII.1976, D.S. Chandler (UAIC); Maricopa Co.: 1♂, Agua Fria, 26.VIII.1937, D.H. Duncan (UMSP); 1♂, Gila Bend, 25.VIII.1935, F.H. Parker (UMSP); Pima Co.: Baboquivari Mts., 1♂, 27.IV.1947, A.L. Melander (UCRC), 2♂, 7.VI.1924, C.C. Poling (CASC); 4♂, Baboquivari Mts., Baboquivari Cyn., West Side, 25–27.VII.1952, Leech & Green (CASC); Baboquivari Mts., Brown Cyn., 1♂, 7.IX.1958, L. Martin (LACM); 1♂, 29–30.VII.1952, Leech & Green (CASC); 1♂, Continental, 27.VII, W.J. Chamberlin (UMSP); 3♂, 5mi E. Continental, 29.VIII.1959, H.E. Evans (CUIC); Tucson, 1♂, 3.V.1963, C.E. Mickel (LACM), 2♂, 6.V.1963, C.E. Mickel (UMSP), 1♂, 9.V.1962, C.E. Mickel (LACM); 1♂, 1.VI.1933, 1♂, 1.VI.1935, 1♂, VIII, 52♂, 1.VIII.1939, 1♂, 10.IX.1935, 6♂, 20.IX.1935, D. Bryant (UMSP); 1♂, 11.VIII.1924, E.P. Van Duzee (CASC), 1♂, 20.VII.1935, D. Bryant (CASC); 1♂, 24.V.1920, F.X. Williams (CASC); 1♂, 10.VIII.1939, R.H. Crandall (UMSP); 2♂, Catalina foot-hills, N end Campell Ave., 5.VIII.1967, Noller; Saguaro Nat. Mon., 1♂, 8.V.1962, 1♂, 18.V.1960, 1♂, 30.VI.1961, G.

Butler (LACM); 3♂, Santa Catalina Mts., 26.VI.1933, Bryant (UMSP); 22♂, Santa Catalina Mts., west slope Pusch Peak, 17.V.1963, C.E. Mickel (UMSP); 1♂, Sycamore Cyn. nr. Rugby, 22.V.1954, S. Selgimar (LACM); Santa Rita Mts., Madera Cyn., 1♂, 20–27.VII.1940, 1♂, 1.VIII.1947, 1♂, 14.VIII.1949, 1♂, 23.VIII.1948, L. Martin (LACM); 2♂, 30.VII.1955, F.X. Williams (CASC); Pinal Co.: 1♂, Irene Wash, 24.V.1963, C.E. Mickel (UMSP); 1♂, Oracle, 28.VI.1924, J.O. Martin (CASC); 1♂, Picacho Peak, 11.VIII.1965 (UCRC); 1♂, Superstition Mts., 16.VII.1943, R.Q. Flock (UCRC); 1♂, Santa Cruz Co., Tumacacori, 27.VIII.1975 (UAIC); Santa Cruz Co.: 1♂, Patagonia, VII.1937, E. Ross (CASC); Yavapai Co.: 1♂, 9.VIII.1962, F. Werner & J. Bequaert (LACM); 1♂, Congress, 19.VII.1939, N. Stagger (UMSP); 1♂, Skull Valley, 31.VII.1970, J.E. May (UAIC); Yuma Co., 1♂, Yuma, 1907 (UCRC); California, Riverside Co., 10♂, Palm Springs, 6.VI.1932 (UMSP); San Bernardino Co., 1♂, Apple Valley, 2.V.1955, Harwick (CNCI); San Bernardino Co., 3♂, Yermo, 16.V.1919, W.M. Pearce (UMSP). MEXICO: 1♂, Sinolaa, N Rio Fuerte Hwy, 13.VI.1965, E. M. Fisher (LACM); 1♂, Sonora, 16mi NE. Ciudad Obregón, 13–17.V.1961, Howden & Martin (CNCI); 1♂, Islas Tres Marías, Isle María Madre, village, 21.V.1925, H.H. Keifer (CASC).

*Distribution.*—*Acrophotopsis eurygnatha* occurs in the Mojave Desert of Nevada to the Sonoran Desert of Arizona and Mexico. The new locality data from the Isle María Madre in the Islas Tres Marías, provides a considerable range extension. Only one specimen was seen from this region and it did not differ significantly from typical *A. eurygnatha*. However, due to its disjunct distribution from the rest of *A. eurygnatha*, only careful examination of more specimens from this same region can verify whether it is truly *A. eurygnatha* or a undescribed species.

*Remarks.*—Schuster (1958) designated a holotype and 16 paratypes for *A. eurygnatha*. Thirteen additional specimens

(USNM) are labeled as paratypes by Schuster. These specimens are not among the designated paratypes and are not conspecific with *A. eurygnatha*. In actuality, they are *A. mickeli* and have been included in the other material examined for that species. As with *A. campylognatha*, there may be many more specimens labeled as paratypes. Some of them might also be *A. mickeli*.

#### KEY TO SPECIES OF *ACROPHOTOPSIS* (MALES)

- 1 Pronotum with transverse furrow between epaulets (Fig. 6); cuspis elbowed, with four broad, distally curved spines on internal boarder (Figs. 7–9) ..... *bergi* Casal
- Pronotum without transverse furrow between epaulets (Figs. 2, 11); cuspis straight with normal setae (Figs. 4, 5, 12–16) ..... 2
- 2 (1) Second metasomal segment brownish-red to dark brown, at least under felt lines, not concolorous with head and mesosoma ..... 3
- Entire metasoma concolorous with head and mesosoma, not darkened under felt lines ..... *campylognatha* Schuster
- 3 (2) Cuspis stout, length of visible portion not more than 6× width (Figs. 12, 13); apex of cuspis armed with several straight spines and internal boarder of cuspis armed with row of shorter, curved spines (Figs. 13,14); parameres stout, length of not more than 8× width (Figs. 12, 13); width of mandible at excision distinctly greater than the depth of excision; legs entirely yellowish ..... *eurygnatha* Schuster
- Cuspis thin, length of visible portion greater than 8× width (Figs. 4, 5); apex and internal boarder of cuspis not armed with spines, clothed only with setae (Fig. 4); parameres thin, length equal to or more than 10× width (Figs. 4, 5); width of mandible at excision equal to depth of excision; hind femora and usually distal third of middle femora darkened ..... *mickeli* Pitts, n. sp.

#### ACKNOWLEDGMENTS

We thank E. H. Tilgner (University of Georgia, Athens) and T. L. Pitts-Singer (University of Georgia, Athens) for critically reviewing drafts of this paper; W. Pulawski (CASC), T. R. Schultz (USNM), L. S. Kimsey (UCDC), R. R. Snelling (LACM), J. T. Huber (CNCI), E. R. Hoebeke (CUIC) and C. A. Olson (UAIC) for loans of the specimens; P. J. Clausen (UMSP) for loaning specimens and C. E. Mickel's notes; K. V. Krombein (USNM) and W. Pulawski (CASC) for answering questions concerning this project. We are thankful for the assistance provided by M. A. Farmer and J. A. Shields of the Center of Ultrastructural Studies, University of Georgia. The following institutions provided support to JPP for this study: the CNCI for a CanaColl grant allowing JPP to travel to the CNCI, Ottawa, Canada in 1999 and American Museum of Natural History for the Theodore Roosevelt Memorial Fund for travel to the Southwestern Research Station (SWRS), Portal, Arizona during 2000. We thank Wade Sherbrooke for his hospitality and help during JPP's stay at the SWRS. We are also grateful for the financial support provided by the University of Georgia, Department of Entomology.

#### LITERATURE CITED

- Brothers, D. J. 1975. Phylogeny and classification of the aculeate Hymenoptera, with special reference to Mutillidae. *University of Kansas Science Bulletin* 50: 483–648.
- Brothers, D. J. 1999. Phylogeny and evolution of wasps, ants, and bees (Hymenoptera, Chrysidoidea, Vespoidea, and Apoidea). *Zoologica Scripta* 28: 233–249.
- Casal, O. H. 1967. Comentarios sobre *Acrophotopsis* Schuster, con la descripción de una nueva especie de México (Hymenoptera: Mutillidae). *Physis* 74: 1–4.
- Ferguson, W. E. 1963. Note on the behavior of male nocturnal mutillid wasps. *Pan-Pacific Entomologist* 39: 65–66.
- Ferguson, W. E. 1967. Male sphaerophthalmine mutillid wasps of the Nevada Test Site. *Brigham Young University Science Bulletin, Biological Series* 8: 1–26.
- I.C.Z.N. 1999. *International Code of Zoological Nomenclature*, Fourth Edition, Adopted by the International Union of Biological Sciences. International

- Trust for Zoological Nomenclature, London XXIX +306 pp.
- Lelej, A. S. and P. G. Nemkov. 1997. Phylogeny, evolution and classification of Mutillidae (Hymenoptera). *Far Eastern Entomologist* 46: 1-24.
- Menke, A. S. 1993. Notauli and parapsidial lines: just what are they? *Sphecos* 24: 9-11.
- Schuster, R. M. 1958. A revision of the sphaerophthalmine Mutillidae of America north of Mexico. II. *Entomologica Americana* 37: 1-130.